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Descriptions of new Leptophlebiidae (Insecta: Ephemeroptera) from Australia. II. *Kaninga*, a new monotypic genus from south-western Australia

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Abstract – The genus *Kaninga* gen. nov. is established to accommodate a new leptophlebiid mayfly species from south-western Australia. Adults and nymphs of *K. gwabbalitcha* sp. nov. are described and figured. Identification keys are presented for both adults and nymphs of the leptophlebiid genera known to occur in south-western Australia.

The first record of the mayfly family Leptophlebiidae from south-western Australia was that of Ulmer (1908), who ascribed adult material to two south-eastern Australia species, *Atalophlebia furcifera* Eaton and *Atalophlebia inconspicua* Eaton. Although the material available to Ulmer has not been re-examined, these identifications are certainly incorrect. The two taxa are probably *Neboissophlebia occidentalis* Dean 1988 and an undescribed species of *Nousia*, respectively. An identification key to nymphs of both described and undescribed genera of Australian Leptophlebiidae was published recently (Dean, 1999). Seven genera, two of which were undescribed, and nine species were recognised from south-western Australia. While additional taxa can be expected, the fauna clearly is not diverse.

This paper is one in a series describing new Australian leptophlebiid taxa (Dean, 1997; Dean *et al.*, 1999). A new monotypic genus is established and diagnosed to accommodate a new species from south-western Australia. Additional genera will be described as nymphs are associated with adults and sufficient adult material becomes available. Examined material was preserved in alcohol, with parts of some specimens mounted on microscope slides. Material is lodged in the entomology collections of the Museum of Victoria (NMV) and the Western Australian Museum (WAM).

Kaninga gen. nov.

Type Species

Kaninga gwabbalitcha sp. nov.

Diagnostic Features

Imago

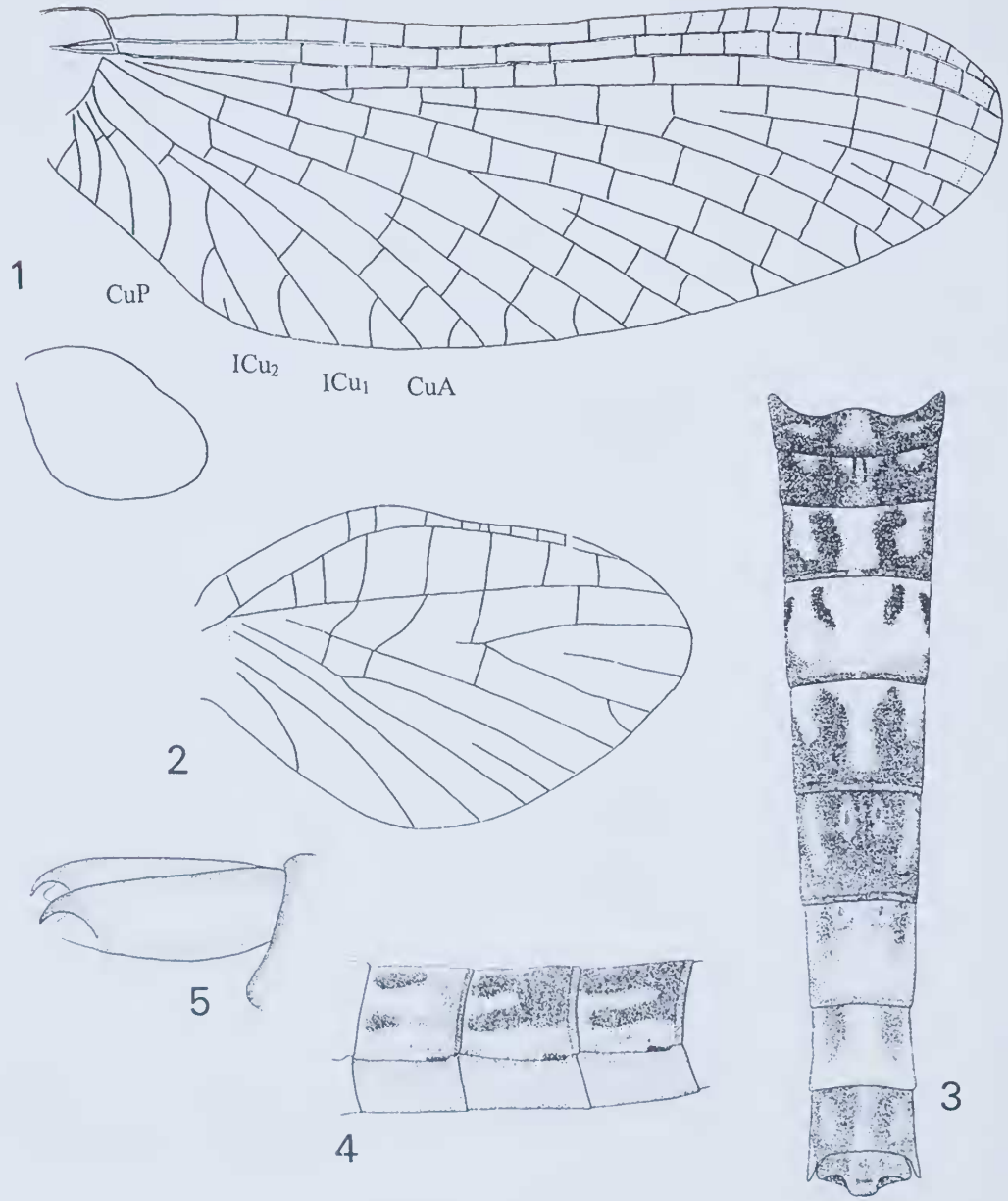
Forewing length-width ratio 2.9 to 3.0; membrane hyaline, without pigment spots (Figure 1); costal and subcostal cells in apical third of wing translucent, whitish; 5–6 weakly developed costal crossveins basal to the bulla, about 14 distal to the bulla; MA forked at 0.41–0.43 wing length; MP_2 attached by crossvein to MP_1 at 0.17–0.18 wing length; base of ICu_1 either linked to CuA–CuP crossvein or, more usually, attached by cross vein to CuA; ICu_1 and ICu_2 diverging as wing margin approached. Hindwing about 0.22 length of forewing; costal margin with shallow concavity just beyond midlength, costal space relatively broad in basal half of wing and narrow distally (Figure 2); vein Sc joining costal margin at a little less than 0.9 wing length; hindwing with about 10 costal crossveins and 6–7 subcostal crossveins. All legs with tarsal claws similar, each with an apical hook and opposing ventral flange (Figure 5). Forelegs of male with ratios of segment lengths 0.84–0.86; 1.00 (3.0 mm); 0.05: 0.32–0.33: 0.31–0.32: 0.25: 0.11–0.12. Male genitalia with claspers three-segmented, basal segment narrowing at about mid length (Figure 6). Penes lobes (Figures 7–10) relatively robust, separated almost to base; each lobe with a broad ventral projection at about ¾ length; gonopores apical. Female ninth sternum with apical margin deeply excavated (Figure 11).

Subimago

Wings uniformly yellowish to pale brown.

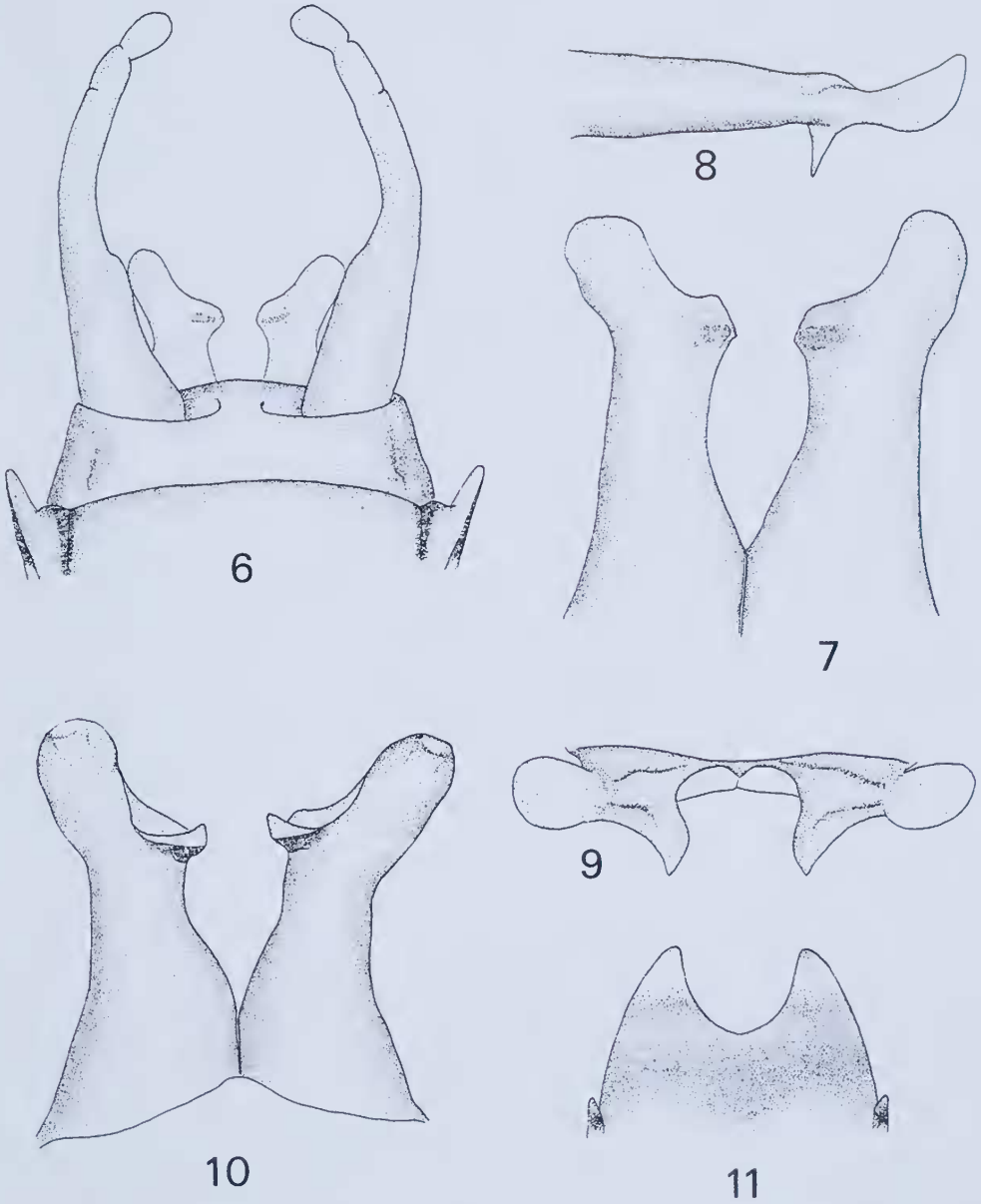
Mature nymph

Head prognathous, antennae 1½ – 2 x width of head. Mouthparts as in Figures 18–23. Clypeus with lateral margins slightly diverging anteriorly. Labrum a little broader than clypeus; width about 2.0x length along median line; broadest a little beyond midlength; anterior margin shallowly concave; frontal fringe a narrow band 3–4 setae deep, sub-apical fringe a single row of setae a little



Figures 1–5 *Kaninga gwabbalitcha* sp. nov. Male imago: 1, wings; 2, hindwing enlarged; 3, abdominal terga; 4, abdominal segments 4–6, lateral; 5, foretarsal claws.

posterior to frontal fringe. Mandible with outer margin bearing tuft of long setae at midlength; setae absent between tuft and incisors, but a series of shorter and finer setae basal to tuft; incisors slender, three apical points and usually three sub-apical spines; prostheca strongly developed. Maxilla with sub-apical row of about 25 pectinate setae; palp moderately short, terminal segment about 2/3 length of middle segment, middle segment bearing simple setae only. Labium with glossae turned under ventrally, not lying in same plane as paraglossae; palp 3-segmented, terminal segment almost as long as middle segment. Legs relatively robust, banded (Figure 13); femur broad, outer margin with row of stout spine-like setae, upper surface with numerous short spine-like setae; all

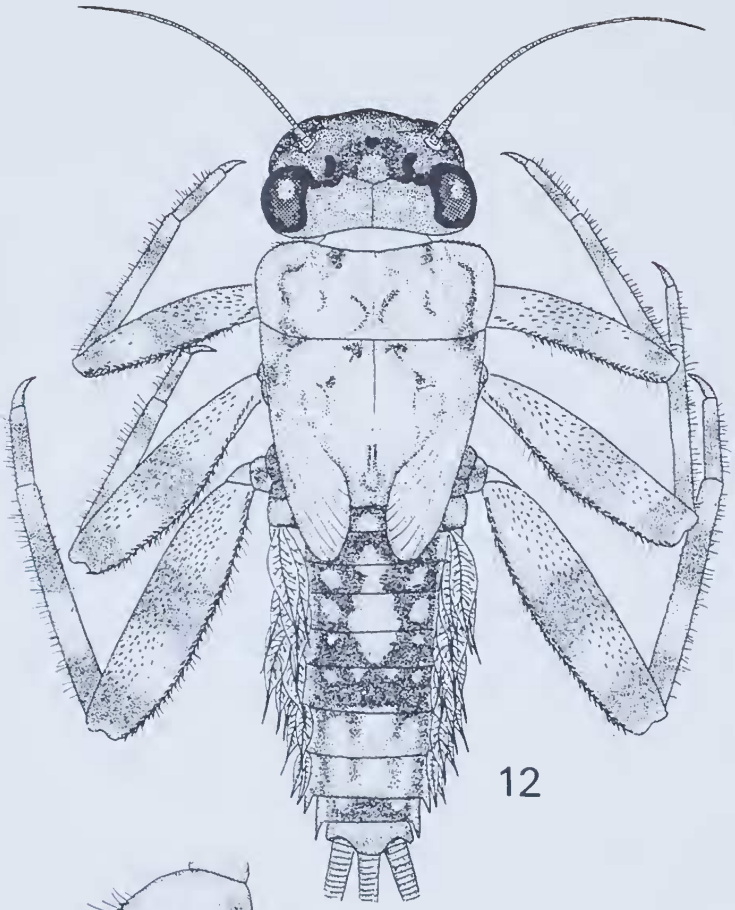


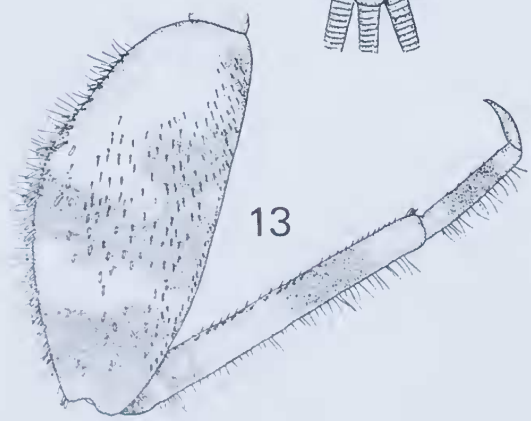
Figures 6–11 *Kaninga gwabbalitcha* sp. nov. Male imago: 6, genitalia, ventral; 7, penes lobes, dorsal; 8, left penes lobe, lateral; 9, penes lobes, apical; 10, penes lobes, ventral (slide preparation). Female imago: 11, sternum nine.

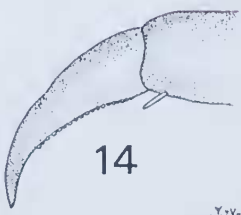
segments with sparse fringe of fine setae along outer margin; tarsal claws (Figure 14) with about 20 small ventral denticles. Abdominal segments with postero-lateral spines on segments 4-9; posterior margins of abdominal terga with continuous row of stout spines (Figure 15), longer and shorter spines interspersed. Gills (Figure 16) present on abdominal segments 1 to 7, each gill with both lamellae broadly lanceolate, narrowing at about 2/3 length, with lateral tracheaea strongly developed. Caudal filaments (Figure 17) with apical whorl of stout spines on each segment, and a series of 4 or 5 fine setae between each stout spine.

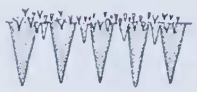
Remarks

The genus has been included previously in identification keys under the designation 'Genus Q' (Dean and Suter, 1996; Dean, 1999). *Kaninga* can be



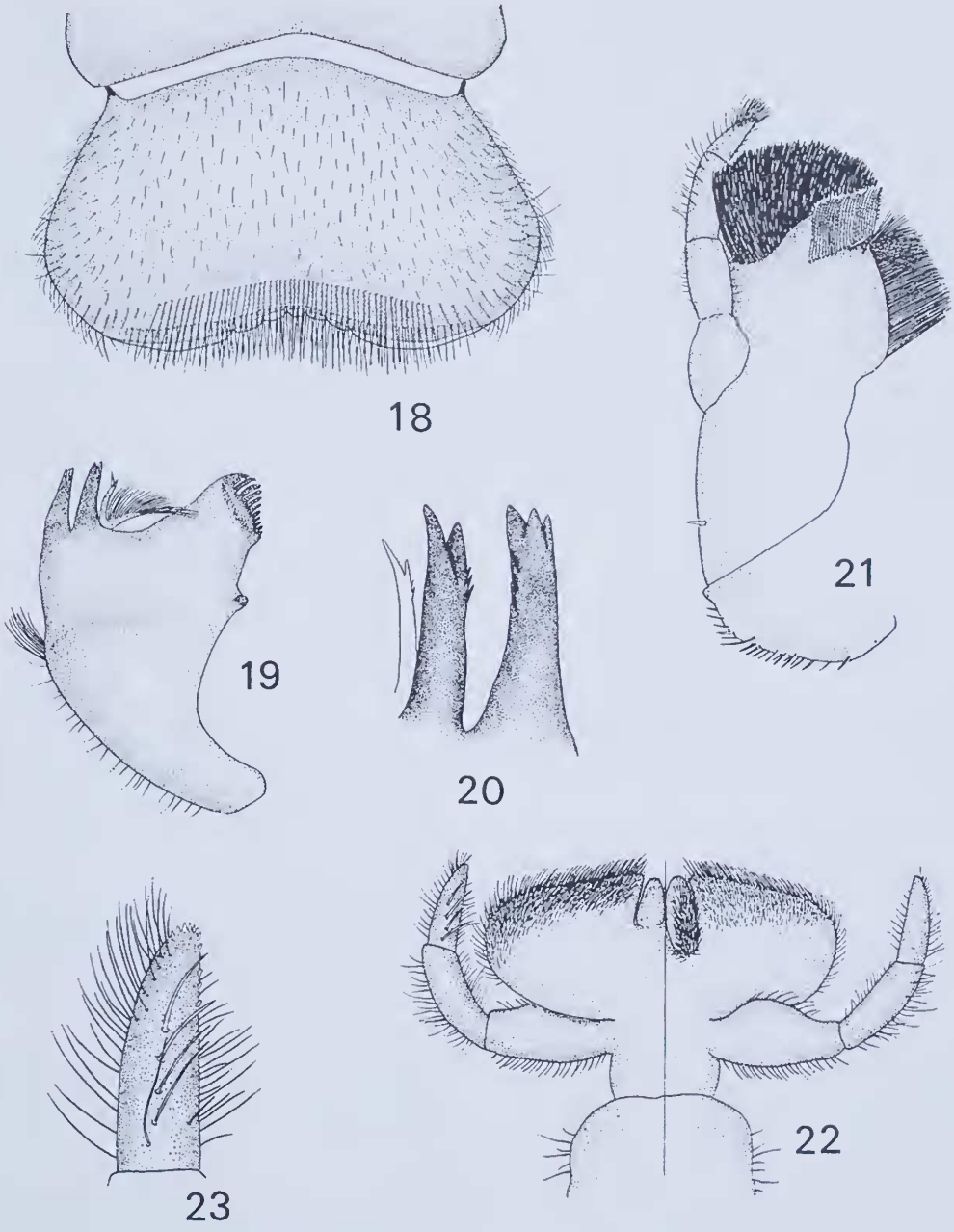






Figures 12–17 *Kaninga gwabbalitcha* sp. nov. Nymph: 12, habitus; 13, foreleg; 14, foretarsal claw; 15, spines on posterior margin of abdominal tergum five; 16, gill from abdominal segment four; 17, terminal filament, midlength.

distinguished from all other leptophlebiid genera by the following combination of characters. Imago: (1) forewing with ICu_1 and ICu_2 diverging as wing margin approached; (2) forewing approximately 4.5x length of hindwing; (3) hindwing with anterior margin broadly rounded, Sc joining wing margin at about 0.9 wing length; (4) tarsal claws similar; (5) male genitalia with penes lobes separated almost to base; each lobe with a broad ventral projection at about ¾ length; (6) ninth sternum of female with apical margin deeply cleft. Nymph: (1) labrum slightly broader than clypeus, width about 2.0x



Figures 18–23 *Kaninga gwabbalitcha* sp. nov. Nymph: 18, labrum; 19, left mandible; 20, incisors, right mandible; 21, right maxilla, ventral; 22, labium, dorsal (left of midline) and ventral (right of midline); 23, terminal segment of labial palp, dorsal.

length along median line; (2) maxilla with subapical row of about 25 pectinate setae; (3) labium with glossae turned under ventrally, not lying in same plane as paraglossae; (4) tarsal claws with about 20 small ventral denticles; (5) posterior margins of abdominal terga with continuous row of stout spines, longer and shorter spines interspersed; (6) abdominal gills broadly lanceolate, narrowing at about 2/3 length.

Although *Kaninga* appears close to *Bibulmena*, also

from south-western Australia, many of the shared characters (e.g. wing venation, form of the tarsal claws in the imago, shape of sternum nine in the female) are plesiomorphies and therefore not in themselves indicative of a close relationship. Phylogenetic relationships within the Australian Leptophlebiidae have yet to be investigated, and until characters of all genera have been properly assessed the relationship of *Kaninga* to other genera will remain problematic. Autapomorphies which characterise *Kaninga* include the development of large ventral projections on the penes lobes of the adult and the reduction in size of the ventral processes on the tarsal claws of the nymph.

Etymology

The generic name is based on *kan-ing*, a Nyoongar aboriginal word meaning the south-west (Bindon & Chadwick, 1992), in recognition of the apparent restriction of the genus to south-western Australia.

Kaninga gwabbalitcha sp. nov.

Figures 1–23

Material Examined

Holotype

♂ imago, Carey Brook, Staircase Road, Western Australia, Australia, 34°24'S, 115°51'E, 15 December 1989, I. Growns (NMV).

Paratypes

2 male imagos, same locality and collection data (NMV) (wings, genitalia and legs of one paratype mounted on microscope slides).

Other Material Examined

Australia: Western Australia. 1 reared male subimago, 1 reared female subimago, type locality, 2 December 1988, I. Growns; 1 female imago, 2 female subimagos, 16 nymphs, type locality, 15 December 1989, I.Growns (NMV, WAM); 7 nymphs, Carey Brook, 20km west of Pemberton, 26 November 1978, A. Neboiss; 1 nymph, Carey Brook, Vasse Highway, approx. 16km west of Pemberton, 5 September 1980, A. Wells; 1 nymph, Donnelly River, Sandy Hill Rd, 34°20'S, 115°50'E, 2 Nov 1995, MRHI (Monitoring River Health Initiative); 1 nymph, Beedelup Brook, 34°25'S, 115°52'E, 28 January 1995, MRHI; 1 nymph, Fish Creek, O'Sullivan 12 Road, 34°40'S, 116°22'E, 11 October 1994, MRHI.

Description

Imago

Length of male: body 9.3–10.1 mm, forewing 10.2–10.3 mm; Length of female: body 12.3 mm, forewing 12.8 mm. Antennae with pedicel and scape reddish-brown, flagellum brownish/yellow. Ocelli white, black at base; lateral ocelli about 2x diameter of medial ocellus. Upper lobes of male eyes pale brown-orange, in contact dorsally; lower lobes grey-black. Pronotum yellow, carinae and lateral margins dark brown, some brown pigmentation on surface between carinae. Meso- and metanotum golden brown, thoracic pleura golden with localised patches of dark brown. Legs without banding; forefemur medium brown, middle and hind femora slightly paler and with less uniform brown pigmentation; remaining segments of all legs yellow. Abdominal terga with pattern of contrasting pale yellow (sometimes with a reddish tinge) and dark brown (Figures 3,4); abdominal sterna uniformly washed with pale red. Terminal filaments pale, medial filament strongly developed. Penes lobes (Figures 8–10) each with a broad ventral projection at about 2/3 length.

Subimago

Wings uniformly pale yellowish to brown; abdominal markings similar to imago but without reddish hue.

Mature nymph

Robust, general colour medium brown/yellow. Dorsum of head predominantly medium brown, paler yellow between eyes, dark brown almost black in region of ocelli (Figure 12). Antennae pale yellow. Labrum width about 2.0x length along median line; anterior margin shallowly concave; frontal fringe a narrow band of setae, sub-apical fringe a single row of setae. Legs pale yellow with medium brown banding (Figure 13). Abdominal terga contrasting dark brown and yellow; segments 7 and 8 paler than remaining segments (Figure 12); abdominal sterna pale yellow. Gill lamellae white, tracheae dark brown.

Distribution

The species appears to be restricted in distribution to small- and medium-sized forest streams in south-western Australia.

Etymology

The species name is derived from *gwabbalitch*, the Nyoongar word for handsome, and refers to the striking appearance of the adult.

Keys to genera of Leptophlebiidae from south-western Australia

Seven leptophlebiid mayfly genera are now known from south-western Australia. Of the two undescribed genera previously recognised (Dean, 1999), 'Genus Q' is described in the present work.

Examination of associated adults of 'Genus S sp.AV1' indicates that species of the second genus can be accommodated in *Loamaggalangta*.

Imagos

1. Tarsal claws dissimilar, one slender with an apical hook, the other swollen, pad-like (Dean, 1988, figure 9) ..... *Neboissophlebia*
- Tarsal claws similar, each with an apical hook and opposing ventral flange (present study, figure 5; Dean, 1987, figure 30) 2

2(1). Hindwing with conspicuous projection on costal margin (Dean, 1987, figure 2) ..... *Nyungara*
- Hindwing without projection, costal margin gently curved (present study, figure 2: Dean, 1987, figure 24) 3

3(2). Forewing with ICu_1 and ICu_2 strongly diverging as wing margin approached (present study, figure 1; Dean, 1987, figure 23) 4
- Forewing with ICu_1 and ICu_2 weakly diverging or parallel as wing margin approached (Dean *et al.*, 1999, figure 1; Ulmer, 1908 figure 27) 6

4(3). Forewing with 20 or fewer costal crossveins (present study, figure 1) ..... *Kaninga*
- Forewing with 25 or more costal crossveins (Dean, 1987, figure 23) 5

5(4). Forewing with costal crossveins anastomosed in apical ¼ of wing (Dean, 1987, figure 23) ..... *Bibulmena*
- Forewing with costal crossveins not anastomosed in apical ¼ of wing (Suter, 1986, figures 1a, 3a) ..... *Atalophlebia*

6(3). Forewing with ICu_1 linked to CuA-CuP crossvein (Dean *et al.*, 1999, figure 1) ..... *Loamaggalangta*
- Forewing with ICu_1 not linked to CuA-CuP crossvein (Ulmer, 1908, figure 27) ..... *Nousia*

Nymphs

1. Abdominal gills with three apical filaments (Dean, 1999, figure 43) ..... *Atalophlebia*
- Abdominal gills either lanceolate or narrowing to single apical filament (present study, figure 16; Dean, 1987, figures 15, 35) 2

2(1). Tarsal claws smooth (Dean, 1988, figure 16) or with very small ventral denticles (present study, figure 14) 3
- Tarsal claws with prominent ventral teeth (Dean, 1987, figure 14) 6

3(2). Tarsal claws with small ventral denticles (present study, figure 14) ..... *Kaninga*
- Tarsal claws smooth (Dean, 1987, figure 34; Dean, 1988, figure 34) 4

4(3). Labrum relatively broad, width 2.3 to 2.5 x length along median line (Dean, 1999, figure 122); gills very narrow, linear, without lateral tracheae (Dean, 1999, figure 121) ..... *Neboissophlebia*
- Labrum less broad, width 1.7 to 1.9 x length along median line (Dean, 1987, figure 37; Dean, 1999, figures 73, 230, 232); gills variable, narrow, moderately or broadly lanceolate (Dean, 1999, figures 76, 231, 233) 5

5(4). Gills broad, lateral tracheae strongly developed; inner margin of each lamella convoluted to form small recess near base of terminal filament (Dean, 1999, figure 76) ..... *Bibulmena*
- Gills narrow to moderately broad, lateral tracheae varying from almost absent to moderately developed, inner margins of lamellae never with recess (Dean, 1999, figures 231, 233) ..... *Loamaggalangta*

6(2). Labrum with sparse but well-defined sub-apical setal fringe (Dean, 1999, figure 129) ..... *Nousia*
- Labrum without sub-apical setal fringe (Dean, 1999, figures 170, 171) ..... *Nyungara*

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